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APPLICATION NO.	FILING DATE	FIRST NAMED INVENTOR	ATTORNEY DOCKET NO.	CONFIRMATION NO.
10/766,231	01/27/2004	Ardeshir Riahi	H0006763--1170	2931
128	7590	10/18/2006	EXAMINER	
HONEYWELL INTERNATIONAL INC. 101 COLUMBIA ROAD P O BOX 2245 MORRISTOWN, NJ 07962-2245			VERDIER, CHRISTOPHER M	
			ART UNIT	PAPER NUMBER
			3745	

DATE MAILED: 10/18/2006

Please find below and/or attached an Office communication concerning this application or proceeding.

Office Action Summary	Application No. 10/766,231	Applicant(s) RIAH ET AL.	
	Examiner Christopher Verdier	Art Unit 3745	

-- The MAILING DATE of this communication appears on the cover sheet with the correspondence address --

Period for Reply

A SHORTENED STATUTORY PERIOD FOR REPLY IS SET TO EXPIRE 3 MONTH(S) OR THIRTY (30) DAYS, WHICHEVER IS LONGER, FROM THE MAILING DATE OF THIS COMMUNICATION.

- Extensions of time may be available under the provisions of 37 CFR 1.136(a). In no event, however, may a reply be timely filed after SIX (6) MONTHS from the mailing date of this communication.
- If NO period for reply is specified above, the maximum statutory period will apply and will expire SIX (6) MONTHS from the mailing date of this communication.
- Failure to reply within the set or extended period for reply will, by statute, cause the application to become ABANDONED (35 U.S.C. § 133). Any reply received by the Office later than three months after the mailing date of this communication, even if timely filed, may reduce any earned patent term adjustment. See 37 CFR 1.704(b).

Status

- 1) ☒ Responsive to communication(s) filed on 26 April 2006, 7 August 2006.
- 2a) ☒ This action is **FINAL**. 2b) ☐ This action is non-final.
- 3) ☐ Since this application is in condition for allowance except for formal matters, prosecution as to the merits is closed in accordance with the practice under *Ex parte Quayle*, 1935 C.D. 11, 453 O.G. 213.

Disposition of Claims

- 4) ☒ Claim(s) 1,2,5-13,15-17 and 20-25 is/are pending in the application.
- 4a) Of the above claim(s) _____ is/are withdrawn from consideration.
- 5) ☒ Claim(s) 11,12 and 15 is/are allowed.
- 6) ☒ Claim(s) 1,2,5-10,16,17 and 20-25 is/are rejected.
- 7) ☒ Claim(s) 13 is/are objected to.
- 8) ☐ Claim(s) _____ are subject to restriction and/or election requirement.

Application Papers

- 9) ☒ The specification is objected to by the Examiner.
- 10) ☒ The drawing(s) filed on 1-27-04, 4-26-06 is/are: a) ☒ accepted or b) ☐ objected to by the Examiner.
Applicant may not request that any objection to the drawing(s) be held in abeyance. See 37 CFR 1.85(a).
Replacement drawing sheet(s) including the correction is required if the drawing(s) is objected to. See 37 CFR 1.121(d).
- 11) ☐ The oath or declaration is objected to by the Examiner. Note the attached Office Action or form PTO-152.

Priority under 35 U.S.C. § 119

- 12) ☐ Acknowledgment is made of a claim for foreign priority under 35 U.S.C. § 119(a)-(d) or (f).
- a) ☐ All b) ☐ Some * c) ☐ None of:
1. ☐ Certified copies of the priority documents have been received.
 2. ☐ Certified copies of the priority documents have been received in Application No. _____.
 3. ☐ Copies of the certified copies of the priority documents have been received in this National Stage application from the International Bureau (PCT Rule 17.2(a)).

* See the attached detailed Office action for a list of the certified copies not received.

Attachment(s)

- | | |
|--|---|
| 1) <input type="checkbox"/> Notice of References Cited (PTO-892) | 4) <input type="checkbox"/> Interview Summary (PTO-413)
Paper No(s)/Mail Date. _____ |
| 2) <input type="checkbox"/> Notice of Draftsperson's Patent Drawing Review (PTO-948) | 5) <input type="checkbox"/> Notice of Informal Patent Application |
| 3) <input type="checkbox"/> Information Disclosure Statement(s) (PTO/SB/08)
Paper No(s)/Mail Date _____ | 6) <input type="checkbox"/> Other: _____ |

Applicant's Amendments dated April 26, 2006 and August 7, 2006 have been carefully considered but are non-persuasive. Claims 1-2, 5-13, 15-17, and 20-25 are pending. The Replacement Sheet of Drawings filed April 26, 2006 is acceptable to the examiner. The specification has been amended to correct the informalities set forth in the first Office action. Applicant's argument that paragraph 7, line 3 has not been amended as set forth in the first Office action, because it would be grammatically incorrect, is persuasive, and the objection pertaining to this is withdrawn. Applicant is thanked for pointing this out. Several of the claims/and or specification have been amended to overcome several of the objections to the specification as failing to provide proper antecedent basis for the claimed subject matter. The claims have been amended to correct the informalities set forth in the first Office action and to overcome the rejections under 35 USC 112, second paragraph. Correction of these matters is noted with appreciation.

Applicant's arguments that claim 16 should not and will not be amended in response to the objection to the specification as failing to provide proper antecedent basis for the claimed subject matter, because 37 CFR 1.75(d)(1) and MPEP § 608.01(o) are being misread and misapplied to the instant application, and that these rules and guidelines do not require that each and every term that denotes structure be used in a verbatim sense, nor that each term has to have a specific reference numeral in the drawings, but that rather the intent of these portions is that the description be written so that the terms used in the claim are readily ascertainable, and that the part to which claims terms apply are identified, are not persuasive. As set forth in MPEP 608.01(o), "The meaning of every term used in any of the claims should be apparent from the

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descriptive portion of the specification with clear disclosure as to its import; and in mechanical cases, it should be identified in the descriptive portion of the specification by reference to the drawing, designating the part or parts therein to which the term applies. A term used in the claims may be given a special meaning in the description. **>See MPEP § 2111.01 and § 2173.05(a).<” MPEP 608.01(o) further explains that “This is necessary in order to insure certainty in construing the claims in the light of the specification, *Ex parte Kotler*, 1901 C.D. 62, 95 O.G. 2684 (Comm’r Pat. 1901). See 37 CFR 1.75, MPEP §608.01(i) and §1302.01” and that “The specification should be objected to if it does not provide proper antecedent basis for the claims by using form paragraph 7.44.” The specification is completely silent as to the limitations in claim 16, line 2 of the compressor having an inlet and an outlet, the limitations in claim 16, lines 3-4 of the combustor receiving at least a portion of the compressed air from the compressor outlet, and the limitations in claim 16, lines 6-8, which recite that the turbine receives at least a portion of the compressed air from the compressor. Thus, it is not seen how 37 CFR 1.75(d)(1) and MPEP § 608.01(o) are being misread and misapplied to the instant application, since the specification was objected to as not providing proper antecedent basis for the claims by using form paragraph 7.44 by following the procedure set forth in MPEP 608.01(o). As Applicant apparently recognizes by the remarks on page 15, lines 3-6, the claims form part of the original disclosure and amendment of the specification to be consistent with the claims does not constitute the addition of new matter. By simply amending the specification to include the above objectionable claim terms (as well as the limitations in claims 7 and 22 set forth later below), the objection to the specification as failing to provide proper antecedent basis for the claimed subject matter would be easily overcome.

Applicant has argued concerning Glynn 6,206,638 that this reference does not disclose or remotely suggest any particulars that the compound angle comprises at least a first angle formed with respect to a first predetermined datum structure and a second angle formed with respect to a second predetermined datum structure or any particulars regarding the location of each film cooling hole outlet port being located a first predetermined distance from the first datum structure and a second predetermined distance from the second datum structure. This argument is not persuasive. Glynn (figures 1-3) clearly discloses a plurality of film cooling holes 48, with each film cooling hole having a centerline extending therethrough, with the centerline of each film cooling hole forming a compound angle with respect to a tangent of the airfoil outer surface (column 8, lines 5-7). The compound angle of each film cooling hole centerline comprises a first angle formed with respect to a first predetermined datum structure SL and a second angle formed with respect to a second predetermined datum structure 11. Each film cooling hole has an inlet port and an outlet port, and the outlet port of each film cooling hole is located a first predetermined distance from the first datum structure and a second predetermined distance from the second datum structure.

Applicant has argued concerning Alison Engine which is European Patent 742,347 that this reference relates to a turbine blade and discloses that the film cooling holes 26 are positioned at an acute angle to the outer surface of the airfoil 16, but does not disclose or suggest anything about the angle being a compound angle, let alone the particulars regarding the location of each film cooling hole outlet port. This argument is not persuasive, because figures 1-4 and 9 of

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European Patent 742,347 disclose a plurality of film cooling holes 26 extending through the airfoil, with each film cooling hole having a centerline extending therethrough, with the centerline of each film cooling hole forming a compound angle with respect to a tangent of the airfoil outer surface (column 9, lines 16-18), with the compound angle of each film cooling hole centerline comprising a first angle formed with respect to a first predetermined datum structure (the element 28 and/or the rods 27 in figure 4 adjacent reference numeral 38) and a second angle formed with respect to a second predetermined datum structure 14. Each film cooling hole has an inlet port and an outlet port, and the outlet port of each film cooling hole is located a first predetermined distance from the first datum structure and a second predetermined distance from the second datum structure.

Applicant has not presented arguments concerning the rejections under 35 USC 103(a) applied to claims 9-10 and 24-25, therefore no further comment is deemed necessary.

Claim Objections

Claim 13 is objected to under 37 CFR 1.75(c), as being of improper dependent form for failing to further limit the subject matter of a previous claim. Applicant is required to cancel the claim(s), or amend the claim(s) to place the claim(s) in proper dependent form. All limitations in claim 13 are present in claim 11, lines 11-14, upon which claim 13 depends.

Specification

The specification is objected to as failing to provide proper antecedent basis for the claimed subject matter. See 37 CFR 1.75(d)(1) and MPEP § 608.01(o). Correction of the following is required:

Claim 7, lines 3-5, which recite the mounting section including one or more cooling channel inlet ports in fluid communication with one or more of the internal coolant channels, has no antecedent basis in the specification for the underlined limitation.

Claim 16, line 2, which recites the compressor having an inlet and an outlet, has no antecedent basis in the specification.

Claim 16, lines 3-5, which recite that the combustor receives at least a portion of the compressed air from the compressor outlet, has no antecedent basis in the specification.

Claim 16, lines 6-8, which recite that the turbine receives at least a portion of the compressed air from the compressor, has no antecedent basis in the specification for the underlined limitation.

Claim 22, which recites the mounting section including one or more cooling channel inlet ports in fluid communication with one or more of the internal coolant channels, has no antecedent basis in the specification for the underlined limitation.

The disclosure is objected to because of the following informalities: Appropriate correction is required.

In paragraph 32, line 8, “hold” should be changed to -- hole --.

Claim Rejections - 35 USC § 102

The following is a quotation of the appropriate paragraphs of 35 U.S.C. 102 that form the basis for the rejections under this section made in this Office action:

A person shall be entitled to a patent unless –

(b) the invention was patented or described in a printed publication in this or a foreign country or in public use or on sale in this country, more than one year prior to the date of application for patent in the United States.

Claims 1-2, 5-7, 16-17, and 20-22 are rejected under 35 U.S.C. 102(b) as being anticipated by Glynn 6,206,638 (figures 1-3). Note the turbine blade 10 for a gas turbine engine, comprising an airfoil 12 having an outer surface, a bottom edge, and a top edge, a plurality of internal cooling channels 60, 62 formed in the airfoil, and a plurality of film cooling holes 48 extending through the airfoil and in fluid communication with one of the internal cooling channels, the plurality of film cooling holes arranged into at least two adjacent rows, each row disposed on at least a portion of a line that extends between the airfoil top and bottom edges, and each film cooling hole having a centerline extending therethrough, wherein the centerline of each film cooling hole forms a compound angle with respect to a tangent of the airfoil outer surface (column 8, lines 5-7), and a distance between the centerlines of each film cooling hole is at least a predetermined minimum distance (because the blade is manufactured, the distance is known to be a predetermined minimum distance). Each film cooling hole in each row is offset from each of the film cooling holes in the adjacent row, and the compound angle of each film cooling hole centerline comprises a first angle formed with respect to a first predetermined datum structure SL

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and a second angle formed with respect to a second predetermined datum structure 11. Each film cooling hole has an inlet port and an outlet port, and the outlet port of each film cooling hole is located a first predetermined distance from the first datum structure and a second predetermined distance from the second datum structure. The first and second predetermined datum structures are first and second datum planes, respectively and the planes are disposed perpendicular to one another. A mounting section 14 is coupled to the airfoil bottom edge and is adapted to couple to a turbine wheel, the mounting section including one or more cooling channel inlet ports near 42 in fluid communication with one or more of the internal coolant channels. Also disclosed is a gas turbine engine (not shown), comprising a compressor having an inlet and an outlet and operable to supply compressed air, a combustor coupled to receive at least a portion of the compressed air from the compressor outlet and operable to supply combusted air, and a turbine having the plurality of turbine blades coupled to and extending radially therefrom, the turbine coupled to receive the combusted air from the combustor and at least a portion of the compressed air from the compressor, with each turbine blade having the above features. The mounting section is coupled to the airfoil bottom edge.

Claims 1-2, 5-8, 16-17, and 20-23 are rejected under 35 U.S.C. 102(b) as being anticipated by European Patent 742,347 (figures 1-4 and 9). Note the turbine blade 15 for a gas turbine engine, comprising an airfoil 16 having an outer surface, a bottom edge, and a top edge, a plurality of internal cooling channels 20 formed in the airfoil, and a plurality of film cooling holes 26 extending through the airfoil and in fluid communication with one of the internal cooling channels, the plurality of film cooling holes arranged into at least two adjacent rows,

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each row disposed on at least a portion of a line that extends between the airfoil top and bottom edges, and each film cooling hole having a centerline extending therethrough, wherein the centerline of each film cooling hole forms a compound angle with respect to a tangent of the airfoil outer surface (column 9, lines 16-18), and a distance between the centerlines of each film cooling hole is at least a predetermined minimum distance (because the blade is manufactured, the distance is known to be a predetermined minimum distance). Each film cooling hole in each row is offset from each of the film cooling holes in the adjacent row, and the compound angle of each film cooling hole centerline comprises a first angle formed with respect to a first predetermined datum structure (the element 28 and/or the rods 27 in figure 4 adjacent reference numeral 38) and a second angle formed with respect to a second predetermined datum structure 14. Each film cooling hole has an inlet port and an outlet port, and the outlet port of each film cooling hole is located a first predetermined distance from the first datum structure and a second predetermined distance from the second datum structure. The first and second predetermined datum structures are first and second datum planes, respectively and the planes are disposed perpendicular to one another. A mounting section 17 is coupled to the airfoil bottom edge and is adapted to couple to a turbine wheel, the mounting section including a coolant channel inlet port near 19 extending in fluid communication with the internal coolant channels. The centerline of each film cooling hole forms an angle with respect to a tangent to the airfoil outer surface that is about 30 degrees (column 9, lines 18-23). Also disclosed is a gas turbine engine 10, comprising a compressor 11 having an inlet and an outlet and operable to supply compressed air, a combustor 12 coupled to receive at least a portion of the compressed air from the compressor outlet and operable to supply combusted air, and a turbine 13 having the plurality of turbine

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blades coupled to and extending radially therefrom, the turbine coupled to receive the combusted air from the combustor and at least a portion of the compressed air from the compressor, with each turbine blade having the above features. The mounting section is coupled to the airfoil bottom edge.

Claim Rejections - 35 USC § 103

The following is a quotation of 35 U.S.C. 103(a) which forms the basis for all obviousness rejections set forth in this Office action:

(a) A patent may not be obtained though the invention is not identically disclosed or described as set forth in section 102 of this title, if the differences between the subject matter sought to be patented and the prior art are such that the subject matter as a whole would have been obvious at the time the invention was made to a person having ordinary skill in the art to which said subject matter pertains. Patentability shall not be negated by the manner in which the invention was made.

This application currently names joint inventors. In considering patentability of the claims under 35 U.S.C. 103(a), the examiner presumes that the subject matter of the various claims was commonly owned at the time any inventions covered therein were made absent any evidence to the contrary. Applicant is advised of the obligation under 37 CFR 1.56 to point out the inventor and invention dates of each claim that was not commonly owned at the time a later invention was made in order for the examiner to consider the applicability of 35 U.S.C. 103(c) and potential 35 U.S.C. 102(e), (f) or (g) prior art under 35 U.S.C. 103(a).

Claims 9 and 24 are rejected under 35 U.S.C. 103(a) as being unpatentable over European Patent 742,347 in view of Graham 4,384,823. The European Patent discloses a turbine blade and a gas turbine engine substantially as claimed as set forth above, including compound

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angled film cooling holes that form an angle of about 30 degrees with respect to the tangent to the airfoil outer surface.

However, the European Patent does not disclose that the angle is less than about 20 degrees.

Graham (figure 1) teaches that the angle 20 that film cooling holes 16 make with respect to a tangent to an airfoil outer surface is from about 15 to 45 degrees, for the purpose of providing increased effectiveness in film cooling.

It would have been obvious at the time the invention was made to a person having ordinary skill in the art to form the film cooling holes of the European Patent 742,347 such that they make an angle of less than 20 degrees with respect to the tangent to the airfoil outer surface, as taught by Graham, for the purpose of providing increased effectiveness in film cooling.

Claims 10 and 25 are rejected under 35 U.S.C. 103(a) as being unpatentable over European Patent 742,347 in view of Green 5,374,162. The European Patent discloses a turbine blade and a gas turbine engine substantially as claimed as set forth above, including a predetermined minimum distance between the centerlines of each film cooling hole, but does not disclose that the predetermined minimum distance is between about two and four times a hole diameter.

Green (figures 2-5) shows a cooled turbine blade 16 having film cooling holes 38 which are spaced apart by their centerlines a predetermined minimum distance C which is between approximately three and five times a hole diameter, for the purpose of providing effective film cooling while not weakening the turbine blade.

It would have been obvious at the time the invention was made to a person having ordinary skill in the art to form the film cooling holes of the European Patent 742,347 such that the predetermined minimum distance is between about two and four times a hole diameter, as taught by Green, for the purpose of providing effective film cooling while not weakening the turbine blade.

Allowable Subject Matter

Claims 11-12 and 15 are allowed.

THIS ACTION IS MADE FINAL. Applicant is reminded of the extension of time policy as set forth in 37 CFR 1.136(a).

A shortened statutory period for reply to this final action is set to expire THREE MONTHS from the mailing date of this action. In the event a first reply is filed within TWO MONTHS of the mailing date of this final action and the advisory action is not mailed until after the end of the THREE-MONTH shortened statutory period, then the shortened statutory period will expire on the date the advisory action is mailed, and any extension fee pursuant to 37

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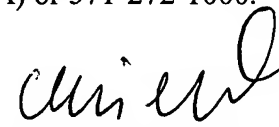
CFR 1.136(a) will be calculated from the mailing date of the advisory action. In no event, however, will the statutory period for reply expire later than SIX MONTHS from the mailing date of this final action.

Any inquiry concerning this communication or earlier communications from the examiner should be directed to Christopher Verdier whose telephone number is (571) 272-4824. The examiner can normally be reached on Monday-Friday from 10:00-6:30.

If attempts to reach the examiner by telephone are unsuccessful, the examiner's supervisor, Edward K. Look can be reached on (571) 272-4820. The fax phone number for the organization where this application or proceeding is assigned is 571-273-8300.

Information regarding the status of an application may be obtained from the Patent Application Information Retrieval (PAIR) system. Status information for published applications may be obtained from either Private PAIR or Public PAIR. Status information for unpublished applications is available through Private PAIR only. For more information about the PAIR system, see <http://pair-direct.uspto.gov>. Should you have questions on access to the Private PAIR system, contact the Electronic Business Center (EBC) at 866-217-9197 (toll-free). If you would like assistance from a USPTO Customer Service Representative or access to the automated information system, call 800-786-9199 (IN USA OR CANADA) or 571-272-1000.

C.V.
October 13, 2006


Christopher Verdier
Primary Examiner
Art Unit 3745